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*Table showing the number of Deaths accruing in each Decade of Age by the Economic Experience, compared with the number which might have been expected to accrue by the combined Experience of Seventeen Offices, and by the Northampton Table.*

	Economic Experience.	Combined Experience.	Northampton Table.
Under 20 .....	10	10·12	16·17
From 20 to 30 .....	80	89·71	182·02
" 30 " 40 .....	207	250·91	502·95
" 40 " 50 .....	313	327·42	627·16
" 50 " 60 .....	342	335·26	515·68
" 60 " 70 .....	242	228·52	258·82
" 70 " 80 .....	79	90·44	88·82
" 80 " 90 .....	9	10·92	11·11
	1282	1343·30	2202·73

*Total Experience of Mortality.*

$$\frac{1282}{1343·3} = 95·44 \text{ per cent. of combined experience.}$$

$$\frac{1282}{2202·73} = 58·20 \quad \text{,,} \quad \text{Northampton.}$$

*On the Mortality arising from Military Operations. By WILLIAM BARWICK HODGE, Fellow of the Statistical Society of London, and of the Institute of Actuaries.\**

THE present paper may be considered a sequel to that upon the "Mortality arising from Naval Operations,"† which I had the honour to lay before the Society in their last session.

Although military affairs are in general looked upon in England with less interest than those of the navy, they derive at this time increased importance from the fact that nearly all the great operations of the present war have been upon land; and have, moreover, from a combination of unfortunate circumstances, been subjected to much criticism and discussion.

The war itself being so recent, the numerical facts relating to it are too little known and authenticated to admit of their being employed to any great extent in this inquiry; and the data for the present paper have therefore, as in that upon naval operations,

\* See Note, page 254, vol. vi.

† *Statistical Journal*, vol. xviii.

been principally drawn from the events of the great revolutionary wars beginning in 1793, although advantage has been taken of such accurate information as could be procured relating to other periods.

The difficulty of such researches proves strongly how desirable it is that full official reports of the statistics of the present war should be laid before the world ; and the recent announcement that the Government does not intend to publish the large collection of facts upon the subject made by one of the Crimean Commissioners, a Fellow of this Society, whose qualifications for the task are so well known, is therefore greatly to be regretted.

It is said, indeed, that although the reports are to be confined to official circles, the public service will have the full benefit of them ; but this, I venture to say, is a great mistake. The full benefit to be derived from information of this description can only be obtained by laying it open to the whole nation, so that every inquirer may be at liberty to sift and examine it, and to point out the conclusions to which he may consider it to lead.

A due regard to the feelings and anxieties of those whose relatives or friends are serving against the enemy, would seem to dictate the promulgation of more regular and precise information as to the deaths which take place at the seat of war. The publication of the nominal returns of the killed and wounded among the private soldiers (now adopted, I believe, for the first time), was no doubt prompted by the consideration referred to ; but the intention would be more completely carried out by inserting in the *Gazette*, in addition to the returns of killed and wounded, monthly lists of the deaths which take place in the military hospitals abroad. If the whole of these returns were regularly transmitted to the Registrar-General, the public would be certain, from the admirable manner in which the statistics of his department are managed, to have full and precise information upon questions of great importance both to the nation and to individuals. Such an arrangement would likewise remedy a defect in the Registration Act pointed out by the Registrar-General himself in his return for the quarter ending December, 1854. "The Act," he says, "has made no provision for the registration of the officers and soldiers of the army who die out of England ; so that while the name, age, rank or profession, place, time, and cause of the death of every man, woman, or child that dies at home are preserved in the registers, the names of the men who uphold in arms the cause and the fame of their country abroad find no place in these records. Otherwise, every family

that has sent forth its sons, and has lost them in the war, would have the satisfaction of knowing that their names were inscribed in a perpetual record, whether they died at Varna, perished at Scutari, sank under the waves of the inhospitable sea, or slumbered at Alma, Balaklava, or Inkermann, beneath the earth of the Crimea consecrated only by their bravery."

There seems to be a general impression that the experience acquired by recent disasters will lead to such a permanent improvement as to preclude the possibility of their recurrence; but the student of our military history will find too many subjects for humiliation and anxiety to join readily in such a belief. The voice of experience, if it could have averted those calamities, has spoken loudly and distinctly enough; but with such slight effect, that much of the language of complaint and remonstrance uttered during the last two centuries may be applied, with hardly the alteration of a syllable, to the present times. "We English," said Marshal Schomberg, in 1689, "have stomach enough for fighting, it is a pity we are not as fond of some other parts of a soldier's business."\* One hundred and twenty years afterwards, on the 17th June, 1809, the Duke of Wellington wrote—"We are an excellent army on parade, an excellent one to fight, but we are worse than an enemy in a country; and take my word for it, that either defeat or success would dissolve us."†

So little change does experience effect in our military system, that Sir John Jones's description of the errors which led to such enormous slaughter in the English sieges in the Peninsula might serve for a criticism on the two unfortunate attacks on the Redan fort at Sebastopol.‡

Sir John Pringle, writing one hundred years ago, said:—"Among the chief causes of sickness and mortality in an army, the reader will little expect that I should rank what was intended for its health and preservation, the hospitals themselves—and that on account of the bad air and other inconveniences attending them."§ Sir James McGrigor, in 1815,|| admitted the truth of the assertion, and pointed out the precautions necessary to prevent the evil; yet there is hardly anything on record equal to the horrors described in the evidence taken before the Crimean Committee as having existed in the English Military Hospital at Scutari, established in the year 1854 upon a salubrious site, in a friendly country,

\* Macaulay's *History of England*, vol. iii., p. 430. † *Despatches*, vol. iv., p. 407.

‡ Jones' *Sieges*: Preliminary Observations, p. xvi.

§ *Diseases of the Army*: Introduction. || *Medico-Chirurgical Transactions*, vol. vi., p. 474.

within reach of a large capital, and with the amplest means for rapid communication with England by sea.

"I have generally," wrote Sir John Pringle, "found those rooms the most healthful, where, from broken windows or other want of repair, the air could not be excluded."\*

Mr. Stafford, speaking of the hospital at Balaklava, says—"I found no ventilation, except from the broken panes of glass, caused by the storm, which had never been mended."†

The Crimean Commissioners have informed us how the horses of our cavalry were starved within a few miles of Balaklava, while a plentiful store of forage was to be found there.‡

Some of the proceedings in that unfortunate harbour, where, to use the language of Milton,

"Horrid confusion, heaped  
Upon confusion, rose,"

seem to have had their type at Lisbon, in 1809, whence Admiral Berkeley, who commanded on the station, wrote to Earl Temple, on the 10th of September in that year—"The horses starved, while ships, loaded with hay and oats from England, enough to furnish all the cavalry, were rotting and spoiling in the Tagus. The medical staff is as bad, as our army were dying away for want of medicines, while more than sufficient were in ships in the river".§

The medical men at Walcheren complained, that when they were in want of wine and porter for the sick, application was made to the Senior Deputy-Commissary-General to purchase these articles, but he refused to do so.|| The medical men in the Crimea complained that when they applied at Balaklava for brandy for cholera patients, they were informed there was none in store.

At Walcheren, much distress, and consequent sickness, arose from the want of cooking-places. The importance of attention to this subject was urged by Sir James McGrigor, yet a large proportion of the sickness in the Crimea was caused by neglect of it.¶

Insufficient clothing was another cause of serious disease among the troops there. "The best clothed were generally among the most healthy regiments," was the warning of Sir James McGrigor in 1815;\*\* and Lord Wellington's opinion upon the point may be inferred from the following extract from a letter he

\* *Diseases of the Army*, p. 106. † *Report of the Commissioners*; Appendix, No. 7617.

‡ *Ibid.*, p. 20.

§ *Court and Cabinet of George III.*, vol. iii., p. 359.

|| *Parliamentary Papers*, p. 646.

¶ *Ibid.*, p. 162.

\*\* *Medico-Chirurgical Transactions*, vol. vi., p. 468.

wrote to General Fane, dated 3rd November, 1810 :—"I wish I had it in my power to give you well clothed troops, or to hang those who ought to have given them their clothing."\*

These painful reminiscences are not brought forward with a view to throw blame upon anyone, still less to create an impression that evils of such magnitude do not admit of a remedy, but simply to show that the information in official hands, which must be infinitely more extensive than any here cited, has failed in suggesting one; and to enforce the opinion that the best hope of success will be found in the fullest and most extensive circulation of correct intelligence as to the evils themselves and their causes.

In most professions, the importance of classifying and studying the results of experience, for the purpose of deducing therefrom rules for future guidance, is fully recognized and acted upon; but in the military and naval services it seems to be but partially understood, although in them of infinitely greater moment, because in many cases officers have no opportunities for acquiring practical experience until they are placed in situations where errors may lead to the most disastrous and fatal results.

There are undoubtedly some exceptions to the second of these remarks, and among them are Sir John Pringle and Sir James McGrigor, to whose observations I have already referred. The works of the former are familiar to everyone who has paid attention to the subject. Sir James McGrigor, well known for many years as Director-General of the Army Medical Board, was at the head of the Medical Department of the Peninsular army during the latter part of the war, at the conclusion of which he wrote a sketch of the medical history of those campaigns in which he had served. This sketch was printed in the sixth volume of the *Transactions of the Medico-Chirurgical Society* (pp. 381 to 490), and appears to have been read before the Society on the same day as Sir Gilbert Blane's celebrated "Statements of the Comparative Health of the Navy." It contains many valuable suggestions as to the preservation of the health of troops on service, and some important statistical returns, which have been found useful in determining points that would otherwise have been left in doubt.

Mr. Guthrie, who served in the Medical Department throughout the Peninsular War, and whose humanity and professional enthusiasm induced him to devote several weeks to gratuitous attendance on the soldiers wounded at Waterloo, has published in his *Commentaries on the Surgery of the War in Portugal*, &c. (sixth edition, London, 1855), some comparative tables. In 1838, Mr. Ruther-

\* *Despatches*, vol. vi., p. 550.

ford Alcock published\* *Notes on the Medical History and Statistics of the British Legion in Spain*, with which he served as Deputy Inspector-General of Hospitals.

General Stewart appended to his *Sketches of the Services of the Highland Regiments* (Edinburgh, 1822), returns of the casualties suffered in each regiment during the period of its service, and a complete list of the killed and wounded in the British army from the beginning of the war in Spain and Portugal to the end of the campaign in the Netherlands. A collection of parliamentary papers, published in 1811 (London, 8vo.), contains full information as to the losses and sickness among the troops employed in the expedition to the Scheldt, better known in England as the expedition to Walcheren. Of all the contributions, however, to this department of knowledge, the most valuable by far, in a statistical point of view, is to be found in the second volume of the *Lancet* for 1837-38, pp. 143 to 148, in a paper "On the Mortality and Sickness of Soldiers engaged in War," by Mr. T. R. Edmonds, a Fellow of this Society, well known by his scientific writings upon vital statistics. Mr. Edmonds enjoyed the unusual advantage of access to the whole of the returns in the Adjutant-General's office, and obtained from them "a full detail of the total loss experienced in the Peninsular army subsequently to Christmas, 1810."

"I considered," he says, "that the knowledge of the particulars of this loss would suffice to afford a correct idea of the destructive effect on life and health produced by a vigorously prosecuted war, on an army generally victorious, and rarely suffering from disastrous retreats." Mr. Edmonds has, I think, been led into erroneous conclusions upon some points, but his general results are invaluable; being, so far as I know, the only systematic collection upon a large scale of numerical results relating to the present subject.

In the paper upon "Naval Mortality," allusion was made to an article in the *Companion to the Almanack for 1853*, entitled "Cost of War" (p. 53), which gave in chronological order lists of the losses sustained by the British in all engagements, whether by sea or land, which took place from 1793 to 1815. Having tested the accuracy of more than three fourths of the numbers relating to the army, including particularly those which refer to operations of magnitude, I have found them almost invariably correct; and I have therefore adopted them, with some slight additions and alterations, as the basis of Table II. in the Appendix. This table contains the total numbers returned as killed and wounded in each

\* London: Churchill, 1838.

year from 1793 to 1815, distinguishing the officers from the non-commissioned officers and rank and file, with columns showing the average effective strength of each class. The effective strengths of the latter were deduced from the returns of the Adjutant-General, printed in the *Appendix to the Journals of the House of Commons*.

The difficulties experienced in the naval inquiry, arising from the almost entire absence of official information, do not exist with respect to the army. Among the parliamentary papers there is a vast mass of returns, containing such copious and extensive information, that it is truly surprising no English author, either historical or professional, should have availed himself of them. M. Dupin, in his *Force Militaire de la Grande Bretagne* (Part I.), published some statistical tables, derived from these returns, to show the state of the British army during the war, from 1804 to 1813; but, from his not being aware of the corrections necessary to be applied, his results are inaccurate. Some portions of his tables were republished in *Marshall's Military Miscellany* (London, 1846)—a valuable work, containing much information as to recruiting, and particularly as to military punishments.

The Adjutant-General's returns show, periodically, the effective strength of the cavalry and infantry of the army; the numbers of the deaths, discharges, and desertions, and of the recruits annually raised; but they only contain occasionally information as to the artillery and engineers, those troops having been, until very recently, under the separate control of the Ordnance Department. The returns of effective strength give the numbers of rank and file only, without non-commissioned officers, who are, however, included in the returns of deaths, discharges, and desertions. In order, therefore, to compare these with the effective strength, it is necessary that a proportionate increase should be made to the latter. This fact, which I only learned through the courtesy of the present Adjutant-General, does not appear upon the face of the returns, and is one of the sources of the errors of M. Dupin.

In the British army, the non-commissioned officers are corporals and sergeant-majors, sergeants, armourers, saddlers, trumpet, drum and pipe majors, trumpeters, drummers, fifers and pipers; and from a comparison of the numbers in the Army Estimates, for two years, they appear to average very nearly 72 to every 1,000 rank and file upon the establishment, or number of men voted by Parliament. The corporals are included in the rank and file, of whom they form about one twentieth part. In all the statements of effective strength in the present paper, the numbers shown by



the returns have been increased in the ratio of 1,072 to 1,000 for non-commissioned officers.

The returns from 1793 to 1800 give the effective strength at the beginning of the year only, and the average numbers for those years are the means of the numbers at the commencement and termination of each year. For the subsequent years, however, the returns are given for the first January and first July in each year, and the averages adopted are the means of the numbers at the beginning, middle, and end of each year. In a body which fluctuates so much as an army, it would certainly be more desirable to have monthly records of the strength. No returns of the effective strength of the artillery and engineers, previously to 1801, have been published; and it has therefore been necessary to form an estimate of the numbers of these corps, from 1793 to 1800, from the numbers of men annually voted for them.

Only one set of returns relating to the commissioned officers actually serving has been discovered. These\* are dated the 11th of May, 1814, and may be supposed to give the actual numbers at the commencement of that year. From it has been drawn out the following

*Abstract of Return showing the Total Number of Officers of all Ranks actually serving in the British Army (including Artillery and Engineers), 11th May, 1814.*

RANKS.	ON FULL PAY.			ON HALF PAY.
	Numbers.	Proportion of each Rank to a total of 100,000 Officers.	Proportion of each Rank to the Effective Strength of 100,000 Non-Commissioned Officers and Rank and File.	
<i>General Officers—</i> Field-M Marshals, Generals-Lieutenant, and Major-Generals .. }	344	2,507	121	120
<i>Field Officers—</i> Colonels, Lieutenant-Colonels, and Majors .....	1,330	9,694	467	181
Captains .....	2,876	20,962	1,009	462
<i>Subalterns—</i> Lieutenants (1st and 2nd), Sub-Lieutenants, Cornets and Ensigns .....	6,630	48,324	2,327	1,268
Adjutants, Paymasters, Quartermasters, and Recruiting Service }	986	7,187	346	515
Medical .....	1,176	8,571	411	188
Chaplains, Commissariat, and Provost-Marshals .....	378	2,755	133	235
Total .....	13,720	100,000	4,814	2,969

\* *Commons' Journals*, 1814, p. 643.

A comparison of this abstract with the effective strength in non-commissioned officers and rank and file at the same period gives for each 1,000 of these a proportion of 48 officers nearly. The numbers in the first column of Table II., headed "Estimated average effective strength" of commissioned officers, were deduced in this ratio from the strength of the non-commissioned officers and privates, shown in the opposite column.

This proportion of officers is greater than upon active service, when there are generally about 40 officers to every 1,000 non-commissioned officers and rank and file; but as the percentage of sickness is always much larger among the men, the relative numbers adopted probably represent the amount of risk to each class in battle.

In order to determine with precision the total mortality caused by casualties in action, it is necessary to ascertain the proportion of those returned as "wounded" who die subsequently of their wounds. Some observations upon this subject occur in the paper on "Naval Mortality,"\* previous to which no attempt had been made to investigate the question generally, except by Mr. Edmonds in his paper in the *Lancet*, already referred to, where he has given a table extracted from the returns submitted to him, showing the number of officers who died of wounds after five great battles.

From this table it appeared that the number dying of wounds was one third of the number of those returned as "killed"; and, concluding that this was the general proportion both for officers and private soldiers, he framed his calculations as to the relative mortality from battle and disease accordingly: but there is strong evidence to show that his hypothesis is incorrect as to both classes.

In the Appendix No. V. will be found a table, constructed from various returns, of officers killed and wounded, and of the numbers of the latter who died of their wounds. These returns were taken from General Stewart's *Sketches of the Highland Regiments*; from Mr. Alcock's work on the *Auxiliary Legion*; from Mr. Edmonds' table already mentioned; and from a statement of "Casualties in the Crimea," returned to the House of Commons by the Adjutant-General on the 7th of April, 1855, and said to have been made up to the latest date, which was probably about the 20th of March. The aggregate casualties recorded in this table amount to 406 officers killed and 1,973 wounded, of the latter of whom 164 died; and it will be seen that neither the general average accords with Mr. Edmonds' rule, nor any of the subordinate collections of facts,

\* *Statistical Journal*, vol. xviii., p. 202.

except that from which it was deduced. The number of officers killed in the Auxiliary Legion was 20, and those dying of wounds was 16, or four fifths of the killed. In the Crimea, the number killed was 91, and those dying of wounds 20, or less than two ninths of the killed. One very remarkable circumstance may be noticed with respect to this table—that where the number killed bears a larger proportion to the number wounded than ordinary, the deaths among the wounded are relatively less; and conversely, where the number killed is small in proportion to the number wounded, the deaths among the latter are relatively greater: there appearing to be a tendency in all the groups of cases towards a uniform ratio between the total deaths and total casualties, although there are great variations as to the proportion of injuries immediately fatal and of those that prove fatal subsequently.

As this table records the results of 1,973 cases, equal to more than two fifths of the whole number of officers wounded from 1793 to 1815, it may be supposed to represent the average deaths with tolerable accuracy; and these being in the proportion of 83·1 per 1,000, or 1 in 12·08, it has been assumed that one twelfth of the officers returned as wounded died of their wounds.

No official returns as to the mortality among the wounded non-commissioned officers and rank and file have been published by the Adjutant-General; but Sir James McGrigor recorded the causes of all the deaths which took place in the Peninsula while he was at the head of the Medical Department.\* The total number is 16,970; and having classified them, I find that 3,411 deaths were caused by wounds and injuries. During the period in question, the numbers returned as wounded were 1,817 officers, and 24,360 non-commissioned officers and rank and file. Deducting, for the deaths among the former, 151, being one twelfth, the ratio already given, we obtain 3,361 as the deaths among the latter, which number bears a proportion to the total wounded of 137 per 1,000 or 1 in 7·25. From the mode in which Sir James' returns were made up, it is possible that some deaths from accidents not occurring in action may have been included in his lists. It has, therefore, been thought advisable to take 1 in 8 as the proportion of deaths among wounded non-commissioned officers and rank and file; and this agrees nearly with the result recorded by Mr. Alcock as to the Auxiliary Legion (page 9), in which the deaths among those returned as wounded were 1 in 7. "The proportion," he says, "would have been lower had the full number of the wounded

\* *Medico-Chirurgical Transactions*, vol. vi., p. 479.

been known ; but many men who had received slight hurts did not report themselves," not having the same motive for doing so as in the British service.

Although there have been no returns illustrating this part of the subject from the Adjutant-General's Office, a published report from the head of the Medical Department in the Crimea, dated the 17th of October, 1855, gave the results of the attack upon the Redan fort at Sebastopol, on the 8th of September preceding. It appears that 1,910 wounded were received into the hospitals upon that occasion ; and of these, 226, or 1 in 8·79, had died on the 16th of October, 37 days afterwards. There were then 556 cases under-treatment, some of which would probably terminate fatally ; and as it is stated that a few of the worst had been left upon the ground, there seems reason to think that the total deaths would approximate very nearly to one eighth of the whole number wounded.

In his *Commentaries*, Mr. Guthrie has given, at page 154, the numbers of the wounded admitted into the hospitals after the battle of Toulouse, and of those that died ; but as his account falls short of the whole number wounded in the battle, it has not been included in the general result given in Table V.

The disproportion between the estimated deaths of wounded officers (one twelfth) and those of wounded soldiers (one eighth), being an increase of 50 per cent. for the latter class, is very great ; but it seems completely established by the following comparative statement, drawn from all the distinct accounts upon the subject that have been published :—

*Proportion of Deaths to 1,000 Wounded.*

	Siege of Gibraltar. (Drinkwater.)	Battle of Toulouse. (Guthrie.)	Auxiliary Legion. (Alcock.)	As Estimated in the present Paper.
Officers .....	29	26	81	83
Non-commissioned Officers, and Rank and File .... }	101	118	142	125

(*To be continued.*)